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A R S
SCIENCE
HALL
OF
FAME

November 28, 1995

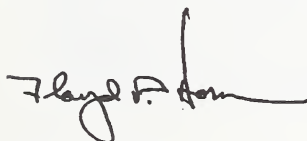
**United States Department of Agriculture
Agricultural Research Service**

The Agricultural Research Service Science Hall of Fame

The ARS Science Hall of Fame was inaugurated in 1986. We determined that each succeeding year, one or more present or former scientists with the Agricultural Research Service could be selected, subject to the following criteria:

- The selectee made a major impact on agricultural research, either by the solution to a significant agricultural problem through research or by providing outstanding leadership that significantly advanced agricultural research.
- The selectee is a person whose accomplishments are still recognized by the agricultural research community.
- The selectee's character and record of achievement is worthy of emulation by younger agricultural scientists.
- The selectee's achievements must be or have been nationally and/or internationally recognized by peers in the scientific community.

Today we honor several outstanding scientists by inducting them into the Science Hall of Fame. A plaque citing the achievements of each will be on permanent display in the ARS National Visitor Center at the Beltsville Agricultural Research Center.



Floyd P. Horn
Administrator

November 28, 1995



Harry Alfred Borthwick
Plant Physiologist (deceased)
Beltsville, Maryland

In recognition of contributions in elucidating the importance of photoperiodic mechanisms controlling flowering in plants.

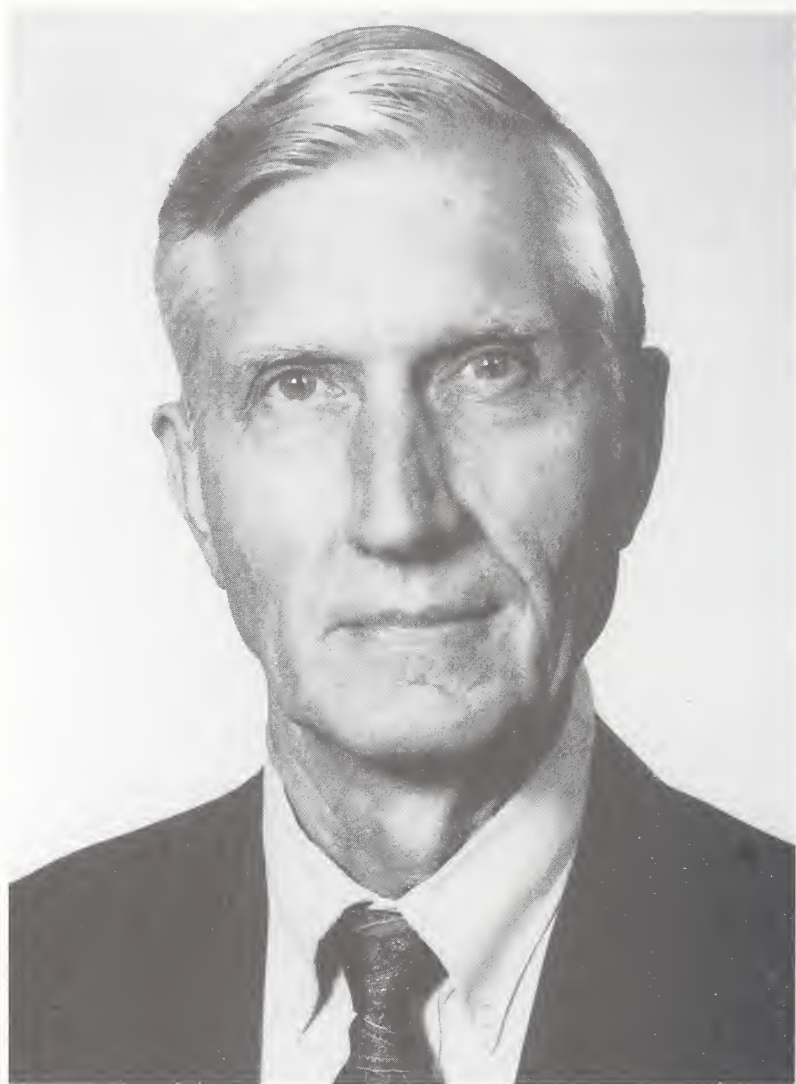
Starting in Beltsville in 1936, a time when plant responses to light were less well understood, Dr. Borthwick spent many years patiently quantifying the photoperiodic controlling of flowering in several selected crops and weeds. These studies formed the basis for work with numerous collaborators that successfully identified and isolated the photoreceptor for daylength detection in plants.

The identification of this red-light-sensitive pigment relied on quantitative action spectroscopy based heavily on Dr. Borthwick's pioneering work. For example, he led the way in the application of high-intensity electric lighting systems for plant cultivation. Uniformly responding plants could thus be obtained year-round. He also determined the stage of plant growth that was most sensitive to photoperiodic control and was among the first to show that a brief flash of dim light delivered at a particular time during a long dark period sufficed to inhibit flowering in a short-day plant.

Dr. Borthwick showed that the photoperiodic stimulus was perceived by leaves and that illumination of a single leaf in the middle of the night is enough to inhibit flowering in plants requiring long uninterrupted nights. Unlike whole plants with complex canopy architecture, single leaves could be mounted and irradiated reproducibly and precisely. In addition, he established that the induction of reproductive development could be accurately, rapidly, and quantitatively identified at an early stage by cytomorphological examination.

Realizing the antagonistic effects of red and far-red radiation on seed germination, Dr. Borthwick and colleagues were able to demonstrate that a similar red/far-red antagonism underlays the photoperiodic response to light. This formed the basis of a hypothesis that light responses in plants resulted from the involvement of a single photochromic pigment called phytochrome.

Phytochromicity provided the key that enabled USDA scientists to develop a spectroscopic assay identifying phytochrome in plant tissue, eventually leading to the isolation and purification of a protein with the spectral properties predicted.



William M. Doane

Research Leader (retired)
Plant Polymer Research Unit
Peoria, Illinois

For initiating, leading, and conducting research which created new and useful products and led to the establishment of new industries based on agricultural raw materials.

Since earning his Ph. D. in 1962 from Purdue University, Dr. Doane has spent his entire professional career at the ARS National Center for Agricultural Utilization Research, conducting and leading research to develop new uses of agricultural materials. He initiated a research program that led to discovery and development of a highly absorbent starch graft polymer. This development, licensed by more than 60 companies, is used in agriculture to increase crop yield and conserve moisture in seed coatings, soil additives, and seedling transplants. It is also used in wound and burn treatment of animals and humans, in disposable soft goods to absorb body fluids, and in scores of industrial applications. This discovery is recognized worldwide as the pioneering effort that has opened up a new technology of superabsorbents.

Dr. Doane's achievements are many. He and his group established new principles and concepts for the use of significant amounts of plant polysaccharides such as starch in plastics. For example, he conceived and initiated a research program to encapsulate pesticides in cereal starch for slow release; to commercialize the process, a twin screw extruder process was devised. He and his colleagues conceived of improvements in starch-based additives for the paper-making industry. Insoluble starch xanthate, a scavenging agent invented by Dr. Doane and colleagues, removes heavy metal ions from industrial effluents, a process used by electroplating companies.

The importance of the Doane group's research to carbohydrate chemistry was acknowledged by receipt in 1993 of the prestigious Alsberg-Schoch Memorial Award by the American Association of Cereal Chemists. A culminating achievement is the complex carbohydrate-based fat substitute dubbed "Oatrim," which has led to a multi-billion dollar industry.

Another recent area of research by Dr. Doane and his associates may have similar impact in the near future. Their development of critical technology for chemically or physically combining significant amounts of polysaccharides.



Walter Mertz, M.D.

Director (retired)

Beltsville Human Nutrition Research Center

Beltsville, Maryland

For contributions and leadership in elucidating the importance to health of several trace elements and promoting research on dietary risk factors for chronic disorders.

Dr. Mertz has enjoyed a distinguished career in nutrition research spanning four decades as an authority in several areas of nutrition. He joined USDA's Human Nutrition Research Division in 1969, a time when there was little public awareness of the health benefits of nutrition research. As Director of the Beltsville Human Nutrition Center (BHNRC) he played a pivotal role in shifting the emphasis of nutrition research from preoccupation with nutrition deficiencies to the interactions of various nutritional factors in reducing risk of debilitating disorders such as diabetes, cancer, heart disease, and stroke.

Dr. Mertz is best known for his discovery that chromium is an essential nutrient involved in carbohydrate metabolism. He demonstrated for the first time that trivalent chromium is a necessary cofactor for the action of insulin and thus apparently essential for the maintenance of normal glucose metabolism. He also participated in research that led to the discovery that selenium is an essential nutrient.

By the mid- and late seventies, when public interest in human nutrition had become a powerful force, BHNRC became, under Dr. Mertz's leadership, the mainstay of nutrition research in the USDA. As an internationally acclaimed scientist, he served as advisor to numerous organizations including the U.S. National Academy of Sciences, World Health Organization, International Atomic Energy Agency and Food and Agricultural Organization. His publications approximate 200. He has edited several books, including the authoritative 2-volume text, *Trace Elements and Human Health*. He presently serves as senior editorial advisor for the upcoming Surgeon General's Report to be released this fall. In addition he is consultant to numerous scientific organizations, both here and abroad.

When Dr. Mertz retired from USDA in 1993, his farewell address, "A Century of Research on Human Nutrition and Beyond," was taped by C-SPAN and viewed by an estimated audience of 3 million.

ARS Science Hall of Fame

1986

Edward F. Knipling

For pioneering research and leadership in development of the sterile insect technique, which led to the eradication of the screw-worm, and of other technologies to suppress and manage insect pests.

1987

Howard L. Bachrach

For pioneering research on the molecular biology of foot-and-mouth disease that led to development of the world's first effective subunit vaccine for any disease of animals or humans through the use of gene splicing.

Myron K. Brakke

For consistent, career-long valuable contributions to the science of virology, particularly plant virology.

Glenn W. Burton

For outstanding achievements in forage and turf science, which have had extraordinary effects on the forage-based cattle industry, the turf industry, and agriculture worldwide.

Wilson A. Reeves

For outstanding research and leadership in the field of textile chemical finishing that has significantly benefited agriculture and consumers.

Ernest R. Sears

For pioneering work in wheat genetics and for discoveries on chromosomal mechanisms that established standards in animal, plant, and human genetics.

Orville A. Vogel

For development of the first useful semidwarf wheats and of innovative production systems that made the Pacific Northwest a major source of soft white wheat, inspired similar research efforts throughout the world, and sparked the Green Revolution.

Cecil H. Wadleigh

For elucidating the mechanisms through which crops respond to salinity and water stress and for inspired planning and leadership that enabled and motivated those who worked with him to expand and make use of knowledge of soils, water, and air and their interactions with plants.

1988

Francis E. Clark

For outstanding research leading to greater understanding of soil, plant, and microbial interactions and of nutrient cycling in terrestrial ecosystems.

Edgar E. Hartwig

For research in soybean breeding and genetics that has been a major factor in soybeans becoming the second most valuable U.S. crop and particularly for developing cultivars that thrive in the South.

Ralph E. Hodgson

For significant contributions to the knowledge of ruminant nutrition and for visionary leadership, both domestic and international, in the animal industries.

Hamish N. Munro

For career-long contributions to the science of nutrition, particularly on the relationship of dietary protein and iron to the health of the elderly, and for promotion of studies on aging.

Jose Vicente-Chandler

For research leading to new and greatly improved production systems for beef, milk, coffee, plantains, and rice for Puerto Rico and Caribbean countries.

1989

Douglas R. Dewey

For world leadership in genetics and taxonomy of the Triticeae tribe of grasses and for development of the cytogenetic basis for creating new grass hybrids.

Theodor O. Diener

For conceptualizing and discovering viroids, for leading research on viroid detection and control, and for inspiring new approaches in the search for causes of several serious diseases affecting plants, livestock, and humans.

Karl H. Norris

For developing principles and instruments using the electromagnetic wave spectrum to make rapid nondestructive measurements for evaluating quality of agricultural products.

John F. Sullivan

For engineering contributions to the food-processing and preservation industries, including development of instant potato flakes and of batch and continuous explosion puffing.

1990**Theodore C. Byerly**

For extraordinary contributions as a scientist, research leader, and administrator to the success of agricultural research programs and advances in U.S. and world agriculture.

Gordon E. Dickerson

For research contributions widely used by breeders to increase production efficiency of cattle, sheep, swine, and poultry.

Robert W. Holley

For isolation and characterization, including the first nucleotide sequence, of transfer ribonucleic acid (tRNA).

Virgil A. Johnson

For outstanding contributions to development of superior bread wheat cultivars and of improved wheat germplasm and for vigorous promotion of national and international cooperation among wheat breeders.

George F. Sprague

For outstanding contributions to effective methods of hybrid corn breeding and germplasm improvement.

1991

John H. Weinberger

For outstanding lifelong contributions in development of fruit varieties and fruit breeding technology.

Walter H. Wischmeier

For developing the Universal Soil Loss Equation, which has been widely used for three decades worldwide in conservation and management of our natural resources.

1992

Raymond C. Bushland

For pioneering research leading to screwworm eradication by the sterile insect technique and for research leading to control of typhus vectors.

Lyman B. Crittenden

For significant contributions to retroviral genetics, transgenic animal development, and genome mapping in poultry.

Arnel R. Hallauer

For increasing understanding and use of quantitative genetics in plant breeding, which has led to development of many superior corn hybrids worldwide.

1993

John R. Gorham

For scientific leadership and studies that have resulted in solutions of disease control problems and have advanced basic knowledge of viral and genetic diseases in humans and animals.

Sterling B. Hendricks (posthumous award)

For significant contributions as a chemist, physicist, mathematician, plant physiologist, geologist, and mineralogist.

Clair E. Terrill

For scientific contributions and worldwide leadership in sheep production research.

1994

Charles N. Bollich

In recognition of superlative accomplishments in rice breeding and genetics and their consequent benefits to American agriculture.

Chester G. McWhorter

For outstanding contributions to American agriculture through basic and applied research that has resulted in improved weed management technology that has increased yields and reduced the cost of production.

Malcolm J. Thompson

For career research contributions in the field of insect and plant steroid biochemistry.



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